



DESCRIPTION OF FEMALES OF THE STINGRAY *DASYATIS COLARENSIS*
SANTOS, GOMES & CHARVET-ALMEIDA, 2004 (CHONDRICHTHYES,
MYLIOBATIFORMES, DASYATIDAE) ¹

(With 11 figures)

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ABSTRACT: The original description of *Dasyatis colarensis* was based solely on male specimens, when the females were until then unknown. Females were collected later in 2004 at the type locality, and they are described herein. An emended diagnosis for the species is also provided. Some characters only verified in females, as a slight notch on the medial portion of the snout, crenulate teeth crowns, and dermal denticles at the ventral side of the disc were identified as secondary sexual dimorphism. The maximum size of *D. colarensis* was also increased, for more than 2600mm of total length and 900mm of disc width.

Key words: *Dasyatis colarensis*. Myliobatiformes. Dasyatidae. Females. Description.

RESUMO: Descrição de fêmeas da raia *Dasyatis colarensis* Santos, Gomes & Charvet-Almeida, 2004 (Chondrichthyes, Myliobatiformes, Dasyatidae).

A descrição original de *Dasyatis colarensis* foi feita com base apenas em exemplares machos, pois as fêmeas eram desconhecidas até então. Fêmeas somente foram coletadas posteriormente em 2004, na localidade tipo, e aqui são descritas. Uma diagnose emendada para a espécie é apresentada. Alguns caracteres somente verificados nas fêmeas, como uma chanfradura na porção medial do focinho, dentes com coroa crenulada e dentículos dérmicos na face ventral do disco foram identificados como dimorfismos sexuais secundários. O tamanho máximo de *D. colarensis* também foi redimensionado, para mais de 2600mm de comprimento total e 900mm de largura de disco.

Palavras-chave: *Dasyatis colarensis*. Myliobatiformes. Dasyatidae. Fêmeas. Descrição.

INTRODUCTION

Dasyatis colarensis Santos, Gomes & Charvet-Almeida, 2004 was described from the mouth of Amazon River, based only on males. Later, females were collected from the type locality. The purpose of this paper is to describe the females of *D. colarensis*, providing an emended diagnosis for the species.

MATERIAL AND METHODS

Morphometric parameters follow SANTOS & CARVALHO (2004), and SANTOS *et al.* (2004). All proportional measurements are expressed as percentage of the disc width. The term 'diamond-

shaped disc' is according to COMPAGNO & ROBERTS (1982); and 'long snouted' or 'short snouted' follow ROSEMBERGER (2000). Tooth counts follow STEHMANN *et al.* (1977). The displacement and nomenclature of tooth bands on upper jaw follow BOURDON (1998). The lower jaw does not show remarkable tooth bands, and therefore this nomenclature was not adopted. Institutional abbreviations follow ESCHMEYER (1998). The comparative material is the same of SANTOS *et al.* (2004), with the addition of specimens of *D. sayi* (Le Sueur, 1817), *D. sabina* (Le Sueur 1824), *D. geijskesi* Boeseman, 1832, *D. colarensis*, and *D. hypostigma* Santos & Carvalho, 2004, listed as additional material examined.

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RESULTS

Order Myliobatiformes Compagno, 1973
Family Dasyatidae Jordan, 1888

Dasyatis Rafinesque, 1810

Dasyatis colarensis Santos, Gomes & Charvet-Almeida, 2004.

Holotype – MNRJ 25179, mature ♂ (Fig.1), 2070mm TL, 630mm DW, Marajó Bay, close to Colares Island, district of Colares, Pará State, Brazil, 00°54'39"S, 48°17'21"W, approximately 6m deep, water temperature 28.6°C, salinity 4ppt, P.Charvet-Almeida coll., 05/XII/2001.

Paratypes – MCP 34811, juvenile ♂, 1260mm TL, 330mm DW, Marajó Bay, close to Colares Islands, district of Colares, Pará State, Brazil; P.Charvet-Almeida coll., 05/XI/2003; UERJ 2006, subadult ♂, 1810mm TL, 530mm DW; same locality and collector as the other paratype, 04/XI/2003.

Emended diagnosis (from SANTOS, GOMES & CHARVET-ALMEIDA, 2004)

Dasyatis colarensis is distinguished by the combination of the following characters: a diamond-shaped (rhomboid) disc and an elongated snout

(preorbital distance ranging from 29 to 37% of the disc width); females over 415mm DW with slight notch on the medial portion of the snout; presence of dark blotches outlining the lower lip; dorsal row of tubercles along midline of disc; dermal patch of small denticles somewhat randomly or circular distributed; females with dermal denticles on the ventral surface of the disc; teeth of the upper jaw of females with rhomboid, crenulate crown; those of sexually mature males with sharp, posteriorly projecting cusps; posterior margins of pectoral fins uniformly rounded; triangular-shaped pelvic fins with posterior margin almost straight or slightly sinuous; pelvic fin tips exceeding posterior margins of disc; dorsal caudal keel absent or as a low crest.

DISCUSSION

The females of *Dasyatis colarensis* (Fig.2) demonstrate to be larger than the males; the largest male (holotype) is about 2070mm TL and 630mm DW; but the largest female (UERJ 2036) reaches 2610mm TL and 910mm DW. Corresponding to the original diagnosis, the females have triangular pelvic fins, elongated snout, dorsal dermal patch of denticles, and dark blotches outlining the lower lip (Fig.3).



Fig.1- Male of *Dasyatis colarensis*, MNRJ 25179 (holotype), 2070mm TL, 630mm DW, in dorsal view.



Fig.2- Female of *Dasyatis colarensis*, UERJ 2036, 1890mm TL, 860mm DW, in dorsal view.

As exclusive characters of females (over 415mm DW), it was registered a slight notch on the medial portion of the snout (Fig.4) and dermal denticles at the ventral side of the disc. Contrasting with the remarkable cuspidate tooth crowns of sexually mature males, the females have only rhomboid tooth crowns. The teeth of lateral bands (15th to 18th and 59th to 62th) of the upper jaw are the largest ones, crenulate, and with a transversal crest (Fig.5). Those of the distal band decrease in size toward the mouth gape corner (Fig.6). The lower tooth rows do not show remarkable differentiation on size or morphology, but the

transversal crest is still present. These differences in tooth morphology can be related to sexual dimorphism, typical feature for the genus (KAJIURA & TRICAS, 1996; LEBRUN, 2001). The tooth rows counts revealed that the females of *D. colarensis* have more tooth rows than the males (43 to 45 on upper jaw and 45 to 60 on lower jaw in males, whereas 66 to 77 on upper jaw and 75 to 77 on lower jaw in females). The numbers of oral papillae is similar in males and females (three to four). As in the holotype, one female (UERJ 2076) showed a forwarded curved, bifurcated central papilla (Fig.7, see arrow).

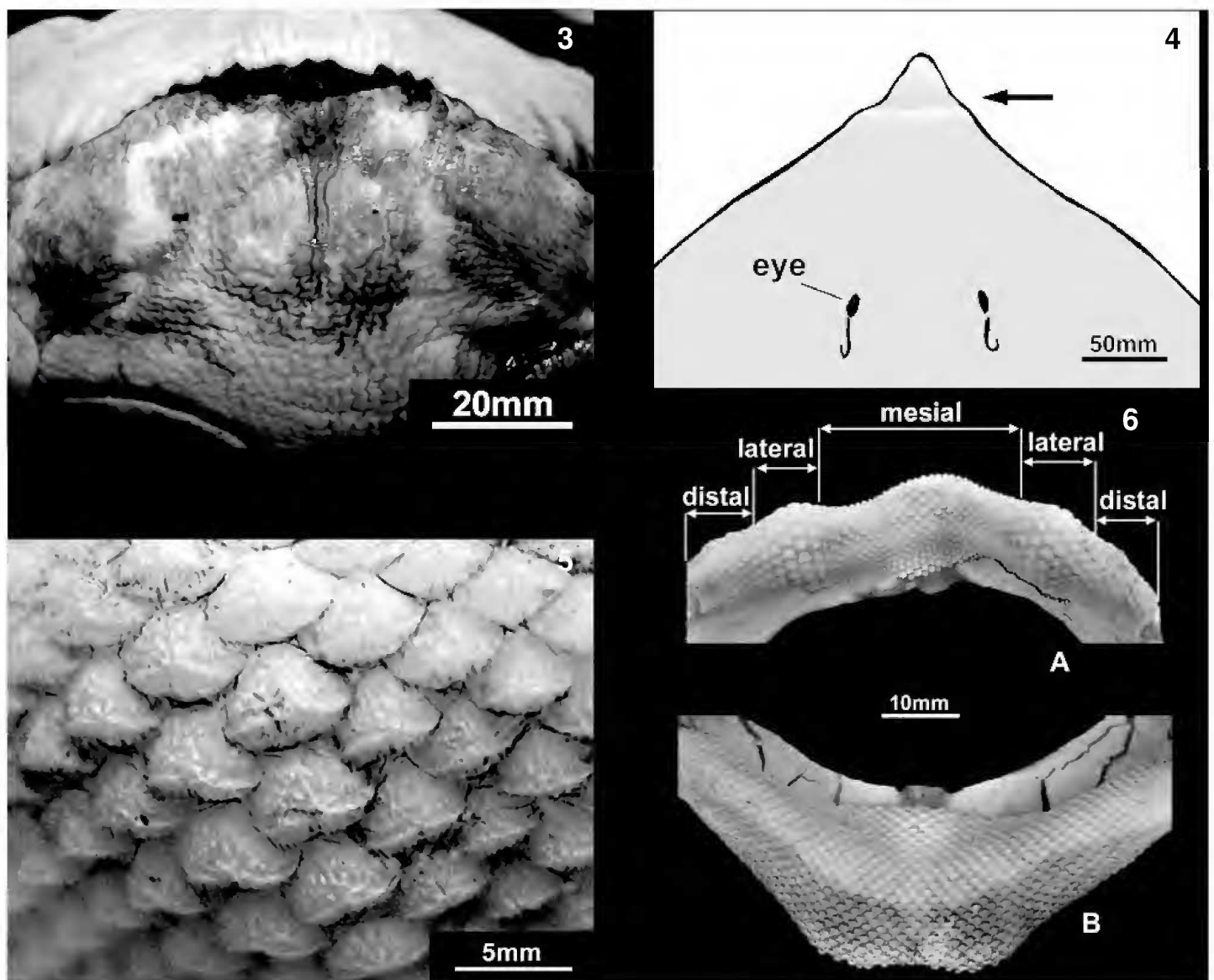


Fig.3- Labial dark blotches of a female of *Dasyatis colarensis*, UERJ 2076 (jaws only); fig.4- Snout region of a female of *Dasyatis colarensis*, UERJ 2036, 1890mm TL, 860mm DW; the arrow indicates the snout notch; fig.5- Lateral teeth band from upper jaw of a female of *Dasyatis colarensis*, UERJ 2076 (jaws only); fig.6- Upper jaw (A) and lower jaw (B) of a female of *Dasyatis colarensis*, UERJ 2076 (jaws only).

Taking in account the morphometric parameters (Tabs.1-2), the females of *D. colarensis* may be included in the 'long snouted dasyatids' group, even though 'shorter snouted' than the males (preoral length 34-36% in males, and 27-29% in females; preorbital length 35-37% in males, and 29-30% in females). Others morphometric divergences between males and females are the internasal width, pelvic fin width, preorbital length, and width of pelvic girdle (Tabs.1-2).

The Western Atlantic long snouted dasyatid stingrays are represented by *Dasyatis geijskesi*, *D. guttata* (Bloch & Schneider, 1801), *D. sabina*, and *D. colarensis*. The females of *D. colarensis* may be set apart from the others Western Atlantic long snouted dasyatids (females and males) by:

1) *Dasyatis sabina*: dorsal tailfold developed (Fig.8A), but as a dorsal keel in *D. colarensis* (Fig.8B); dorsal dermal patch of denticles in *D. colarensis* (Fig.9A), lacking in *D. sabina*; dark labial blotches in *D. colarensis*, wanting in *D. sabina*; five oral papillae in *D. sabina*, and three to four in *D. colarensis* (Fig.7). Tooth counts in *D. sabina* 28 to 38 on upper jaw, and 28 to 36 on lower jaw; meanwhile 66 to 77 on upper jaw, and 75 to 77 on lower jaw in *D. colarensis*. *Dasyatis sabina* reaches about 600mm DW (MCEACHRAN & CARVALHO, 2002), and *D. colarensis* about 910mm DW.

2) *Dasyatis guttata*: dermal patch of denticles in a narrow band along midline from level of orbits to

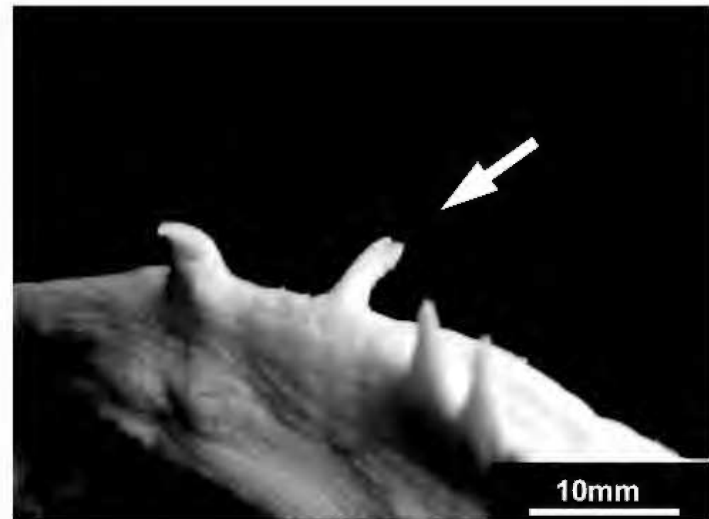


Fig.7- Bifurcated oral papillae (see arrow) of a female of *Dasyatis colarensis*, UERJ 2076 (jaws only).

base of tail in *D. guttata* (Fig.9B), and somewhat circular in *D. colarensis* (Fig.9A); dark blotches outlining the lower lip in *D. colarensis* (Fig.3), lacking in *D. guttata*; females of *D. colarensis* with ventral dermal denticles, absent in *D. guttata*; preoral length 21 to 25% in *D. guttata*, and 27 to 29% in females of *D. colarensis*. Smooth teeth crown in females of *D. guttata* (Fig.10), and crenulate crown in females of *D. colarensis* (Fig.5). Tooth counts in *D. guttata* 31 to 46 on upper jaw, and 34 to 48 on lower jaw; meanwhile 66 to 77 on upper jaw and 75 to 77 on lower jaw in females of *D. colarensis*.

TABLE 1. Morphometric parameters of males of *Dasyatis colarensis* (n=3). SD: Standard deviation.

MORPHOMETRIC PARAMETERS	% OF DW	MEAN	SD
Disc length	100.79 - 103.39	101.90	1.34
Horizontal eye diameter	2.03 - 2.42	2.17	0.21
Interorbital width	9.68 - 10.0	10.20	0.65
Spiracle length	5.15 - 5.71	5.38	0.29
Interspiracular length	13.77 - 15.15	14.40	0.69
Preoral length	34.84 - 36.79	35.52	1.10
Distance between 1 st and 5 th gill slits	10.37 - 11.11	10.79	0.37
Distance between 1 st gill slits	16.66 - 16.98	16.87	0.17
Mouth width	7.61 - 9.39	8.43	0.89
Internasal width	10.15 - 10.90	10.60	0.39
Pelvic fin width	19.68 - 23.33	21.88	1.93
Pelvic fin length	20.00 - 21.42	20.72	0.71
Preorbital length	35.71 - 37.73	36.60	1.03
Pelvic girdle width	12.83 - 13.03	12.95	0.11

TABLE 2. Morphometric parameters of females of *Dasyatis colarensis* (n=3). SD: Standard deviation.

MORPHOMETRIC PARAMETERS	% OF DW	MEAN	SD
Disc length	89.47 - 98.90	95.28	3.72
Horizontal eye diameter	1.64 - 2.89	2.27	0.57
Interorbital width	8.72 - 11.86	10.78	1.21
Spiracle length	4.88 - 6.86	5.89	0.73
Interspiracular length	14.05 - 16.62	14.92	0.99
Preoral length	27.19 - 29.67	28.59	0.96
Distance between 1 st and 5 th gill slits	11.32 - 12.63	11.85	0.58
Distance between 1 st gill slits	17.71 - 19.76	18.53	0.79
Mouth width	7.51 - 9.30	8.16	0.72
Internasal width	8.33 - 9.63	8.78	0.51
Pelvic fin width	17.97 - 22.09	18.76	3.74
Pelvic fin length	14.54 - 19.75	17.01	1.90
Preorbital length	29.06 - 30.76	29.79	0.63
Pelvic girdle width	14.21 - 17.44	15.95	1.24

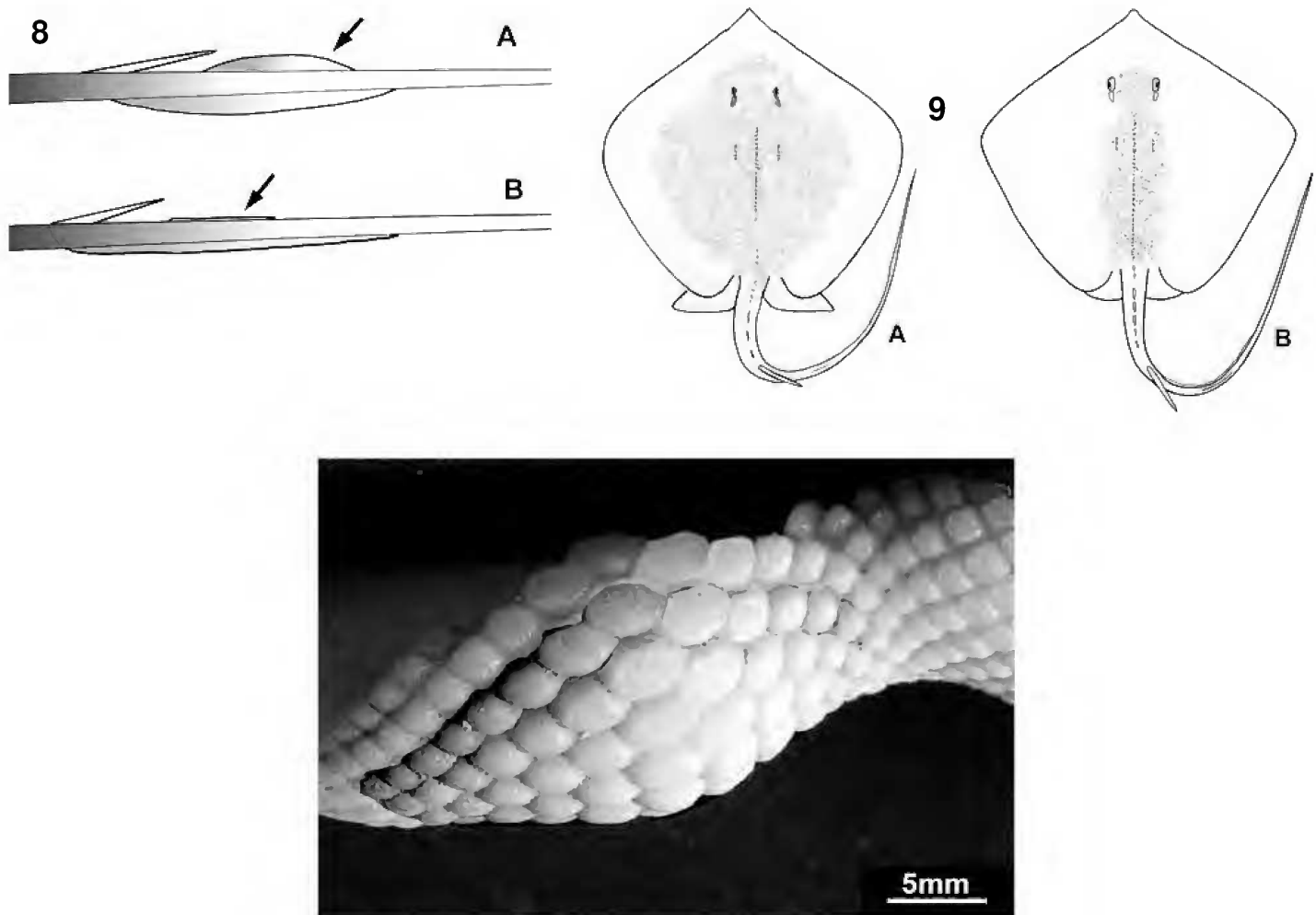


Fig.8- Representation of whiptail of: (A) *Dasyatis sabina*, AMNH 20804, ♀, 451mm TL, 182mm DW the arrow indicates the dorsal tailfold; and (B), *Dasyatis colarensis*, UERJ 2036, ♀, 1890mm TL, 860mm DW. The arrow indicates the dorsal caudal keel; fig.9- Dermal patch of denticles in (A) *Dasyatis colarensis*, UERJ 2036, ♀, 1890mm TL, 860mm DW, and in (B) *D. guttata* UERJ 1088, ♀, 750mm TL, 256mm DW; fig.10- Upper jaw of a female of *Dasyatis guttata*, AC.UERJ 1221, 800mm DW.

3) *Dasyatis geijskesi*: the remarkable wide and sinuous pelvic fins promptly differentiate *D. geijskesi* (Fig.11A) from the triangular pelvic fin of *D. colarensis* (Fig.11B). Preoral length 39 to 54% in *D. geijskesi*, and 27 to 29% in females of *D. colarensis*. Oral papillae count five in *D. geijskesi*, and three to four in *D. colarensis*. Tooth counts 56 to 68 on upper jaw and 56 to 68 on lower jaw in *D. geijskesi*, meanwhile 66 to 77 on upper jaw and 75 to 77 on lower jaw in females of *D. colarensis*.

The others Western Atlantic *Dasyatis* species are short snouted stingrays, and devoid of a dermal patch of denticles all throughout the dorsal side of disc.



Fig.11- Pelvic fin shapes of (A) *Dasyatis geijskesi*, UERJ 2037, ♀, 1890mm TL, 661mm DW, and (B) *Dasyatis colarensis*, UERJ 2062, ♀, 373mm TL, 88mm DW.

CONCLUSION

The dark blotches outlining the lower lip, the number of oral papillae, the squamation pattern, the morphology of dorsal caudal keel, and the pelvic fins shape promptly identify the lately collected specimens as females of *Dasyatis colarensis*. Morphological differences as a slight notch on the medial portion of the snout, crenulate tooth crowns, tooth rows counts, and dermal denticles at the ventral side of the disc were identified as secondary sexual dimorphism. The maximum size of *D. colarensis* was also increased, for more than 2600mm TL and 900mm DW.

ADDITIONAL MATERIAL EXAMINED

Dasyatis colarensis – BRAZIL, PARÁ, Marajó Bay, Colares Island: UERJ 2033, ♀, 2610mm TL, 910mm DW; UERJ 2034, ♀ (head, pelvic girdle and tail); UERJ 2035, ♀, 1220mm TL, 415mm DW; UERJ 2036, ♀, 1890mm TL, 860mm DW; UERJ 2062, ♀, #1: 373mm TL, 88mm DW, #2: 360mm TL, 88mm DW; UERJ 2076, ♀ (jaws only); all specimens P.Charvet-Almeida coll., 05/X/2004.

Dasyatis sabina – USA, FLORIDA, George Sound: AMNH 20804, #1: ♀, 451mm TL, 182mm DW; #2:

♂, 443mm TL, 176mm DW; South of Dougherty Bay: BNMH 1980.9.22.23, ♂, 570mm TL, 210mm DW; TEXAS, Arkansas Bay: BNMH 1948.8.6, ♀, 407mm TL, 170mm DW; Rockport: BNMH 1948.8.6.34-37, #1: ♂, 470mm TL, 175mm DW, #2: ♂, 420mm TL, 165mm DW; Pine Island, CAS 35485, ♂, 235mm TL, 87mm DW; Cedar key, MNHN 1992-1297, ♂, 540mm TL, 238mm DW, MNHN 1992-1298, ♂, 535mm TL, 235mm DW; MNHN 1992-1299, ♂, 458mm TL, 245mm DW, all specimens Sanders Chandler coll., 23/VIII/1978. LOUISIANE: MNHN 0000-2437, ♀, 450mm TL, 170mm DW, C.A. Le Sueur coll.

Dasyatis geijskesi – BRAZIL, PARÁ, Marajó Bay: UERJ 2062, ♂, 610mm DW, 19/VII/2005, UERJ 2037, ♀, 1890mm TL, 661mm DW; UERJ 2038, ♀, head about 380mm of preorbital length; UERJ 2096, ♀, 530mm DW; UERJ 2040, ♂, 690mm DW; all specimens P.Charvet-Almeida coll., 05/XI/2003.

Dasyatis sayi – MARTINIQUE: MNHN 0000-2618, #1: ♂, 425mm TL, 200mm DW, #2: ♀, 410mm TL, 185mm DW, #3: ♀, 365mm TL, 175mm DW; D.Plee coll.

Dasyatis hypostigma – BRAZIL, PARANÁ, Paranaguá: MCP 35005 (holotype), ♂, 760mm TL, 455mm DW, C.M. da Cunha coll., XI/2002.

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LITERATURE CITED

- BOURDON, J., 1998. **Extant Batoids; *Dasyatis sabina* (Le Sueur, 1824), Atlantic Stingray**. Available: <<http://www.elasmo.com>>. Accessed on: nov. 2005.
- COMPAGNO, L.J.V. & ROBERTS, T., 1982. Freshwater stingrays (Dasyatidae) of Southeast Asia and New Guinea, with description of a new species of *Himantura* and reports of unidentified species. **Environmental Biology of Fishes**, **7**(4):321-339.
- ESCHMEYER, W.N. (Ed.), 1998. **Catalog of Fishes**. San Francisco: California Academy of Sciences, **3**:1-2950.
- KAJIURA, S.M. & TRICAS, T.C., 1996. Seasonal dynamics of dental sexual dimorphism in the Atlantic stingray *Dasyatis sabina*. **The Journal of Experimental Biology**, London, **199**:2297-2306, figs.1-8.
- LEBRUN, P., 2001. **Requins, raies et autres chondrichthyes fossiles. Tome I: Diversité, anatomie, classification et phylogénèse des requins et autres chondrichthyes**. Paris: Minéraux & Fossiles, Hôr série, **12**:1-113.
- McEACHRAN, J.D. & CARVALHO, M.R., 2002. Dasyatidae. In: CARPENTER, K.E. (Ed.) **The living marine resources of the Western Central Atlantic. Volume 1: Introduction, mollusks, crustaceans, hagfishes, sharks, batoid fishes and chimaeras**. Rome: FAO. p.562-571 (FAO Species Identification Guide for Fisheries Purposes and American Society of Ichthyologists and Herpetologists Special Publication No.5).
- ROSEMBERGER, L.J., 2001. Phylogenetic relationships within the stingrays genus *Dasyatis* (Chondrichthyes: Dasyatidae). **Copeia**, **2001**(3):615-627.
- SANTOS, H.R.S. & CARVALHO, M.R., 2004. Description of a new species of whiptailed stingray from the southwestern Atlantic Ocean (Chondrichthyes, Myliobatiformes, Dasyatidae). **Boletim do Museu Nacional, Nova Série, Zoologia** (516):1-24.
- SANTOS, H.R.S.; GOMES, U.L. & CHARVET-ALMEIDA, P., 2004. A new species of whiptail stingray of the genus *Dasyatis* Rafinesque, 1810 from the southwestern Atlantic Ocean (Chondrichthyes: Myliobatiformes: Dasyatidae) **Zootaxa**, **492**:1-12.
- STEHMANN, M., McEACHRAN, J.D. & VERGARA, R., 1977. Dasyatidae. In: FISHER, W. (Ed.) **FAO Species Identification sheets for fishery purposes. Western Central Atlantic, Fishing Area 31**. Rome, vol.5, pag. var.